DOCUMENT RESUME

ED 286 569 JC 870 451

AUTHOR Hurov, Janet Torrisi
TITLE A Study of the Relationship between Reading, Computational, and Critical Thinking Skills and Academic Success in Fundamentals of Chemistry.
INSTITUTION Saint Louis Community Coll. at Florissant Valley, Mo.
PUB DATE 87
NOTE 8p.
PUB TYPE Reports - Research/Technical (143) -- Statistical Data (110)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Achievement; Basic Skills; *Chemistry; Community Colleges; *Critical Thinking; Grades (Scholastic); *Mathematics Skills; Predictor Variables; *Reading Skills; Scores; Student Evaluation; *Tests; Two Year Colleges
IDENTIFIERS Nelson Denny Reading Tests

ABSTRACT

In spring 1987, a study was conducted at St. Louis Community College at Florissant Valley (Missouri) to identify the basic skills necessary for the successful completion of the course, "Fundamentals of Chemistry." The study evaluated the relationship between performance on the Nelson-Denny Reading Test (NDRT), the Numerical Reasoning subtest of the Differential Aptitude Test (DAT), and the Watson-Glaser Critical Thinking Appraisal (WGCTA) and final chemistry grades in Fundamentals of Chemistry. Study findings, based on test scores and grades for 118 chemistry students, indicated that: (1) there was a moderate relationship between NDRT scores and course success, with a stronger relationship for vocabulary skills than comprehension skills; (2) the relationship between WGCTA scores and final grades was not as strong as the reading relationship, and the correlation between DAT scores and grades was even weaker; and (3) reading scores lower than the 20th percentile were strongly correlated with unsuccessful grades. (EJV)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED286569

A Study of the Relationship Between Reading, Computational, and Critical Thinking Skills and Academic Success in Fundamentals of Chemistry.

Prepared by: Janet Torrisi Hurov
St. Louis Community College at Florissant Valley.
Spring 1987

JC 870 451

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Janet T. Hurov

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

ABSTRACT

This study evaluated the relationship between performance on the Nelson-Denny Reading Test, the Numerical Reasoning subtest of the Differential Aptitude Test (DAT), and the Watson-Glaser Critical Thinking Appraisal (WGCTA) and achievement in Fundamentals of Chemistry. The study was conducted during the Spring semester of 1987. The results indicate a moderate relationship ($r = .30$) between reading skill and success in Fundamentals of Chemistry. The results suggest that a total percentile of the 20th on the Nelson-Denny Reading Test may be necessary for successful completion of Fundamentals of Chemistry.

* Note: A special thanks to Tom Mines for developing the idea, to the chemistry faculty for their cooperation and enthusiasm, and to Carol Brown for assisting with the assessment process.

BEST COPY AVAILABLE

INTRODUCTION:

This study was conducted to identify basic skills that are necessary for the successful completion of Fundamentals of Chemistry. Three skill areas were identified as being potential prerequisites for this course: reading (at or above the college level), computational skills, and critical thinking ability.

The relationship between these skills and success in Fundamentals of Chemistry was tested by administering 3 different assessment tools to students and correlating their test results with their final grades.

SUBJECTS:

The subjects were all students (N = 118) enrolled in Fundamentals of Chemistry during the Spring semester of 1987. All sections (n = 6) of this course, including both evening sections were sampled. Demographic data reveal that the majority of these students are white females with a mean age of 27.5. Many of these students are preparing for entry into the Nursing Program at Florissant Valley.

COURSE DESCRIPTION:

Study of basic chemical principles: properties of matter, atomic theory, chemical bonding, chemical nomenclature, physical aspects of chemical reactions, etc. This course is intended for non-science majors.

CURRENT COURSE PREREQUISITE:

One year of high school algebra or MTH 007 - Elementary Algebra (SLCC course).

INSTRUMENTATION:

The test instruments used to assess reading, computational, and critical thinking skills were the Nelson-Denny Reading Test, the Numerical Reasoning subtest of the Differential Aptitude Test (DAT), and the Watson-Glaser Critical Thinking Appraisal (WGCTA).

PROCEDURE:

Assessment staff, with the support of the chemistry faculty, entered each lab class during the first two weeks of the course - Spring 1987. Each student was informed about the purpose of the study. Students were told that participation would be reflected in their lab grades, as would non-participation. Testing consumed approximately 2 hours of lab time.

Fourteen students did not complete all three tests and were not included in the database. Twenty students "withdrew" from the course. This data was analyzed in a separate category.

After testing was completed all tests were scored and organized by student and section number. At the end of the Spring semester, chemistry faculty provided a roster of the student's final grade in Fundamentals of Chemistry. This information was analyzed with the test score data.

DATA ANALYSIS:

TABLE I. Relationship between final grades and tests

TESTS	Correlation (r) between tests and final grades in Fundamentals of Chemistry
Nelson-Denny Reading Test	
Vocabulary	r = .28
Comprehension	r = .26
Total	r = .30
Watson-Glaser Appraisal	
Critical Thinking	r = .25
Differential Aptitude Test	
Numerical Reasoning	r = .19

The (r) value describes the degree of relationship between final grades in Fundamentals of Chemistry and test scores. The larger the value the greater the strength of the relationship. The data indicate that the relationship between reading skill and final grade are moderate.

TABLE II. Mean test scores and final grades in Fundamentals of Chemistry.

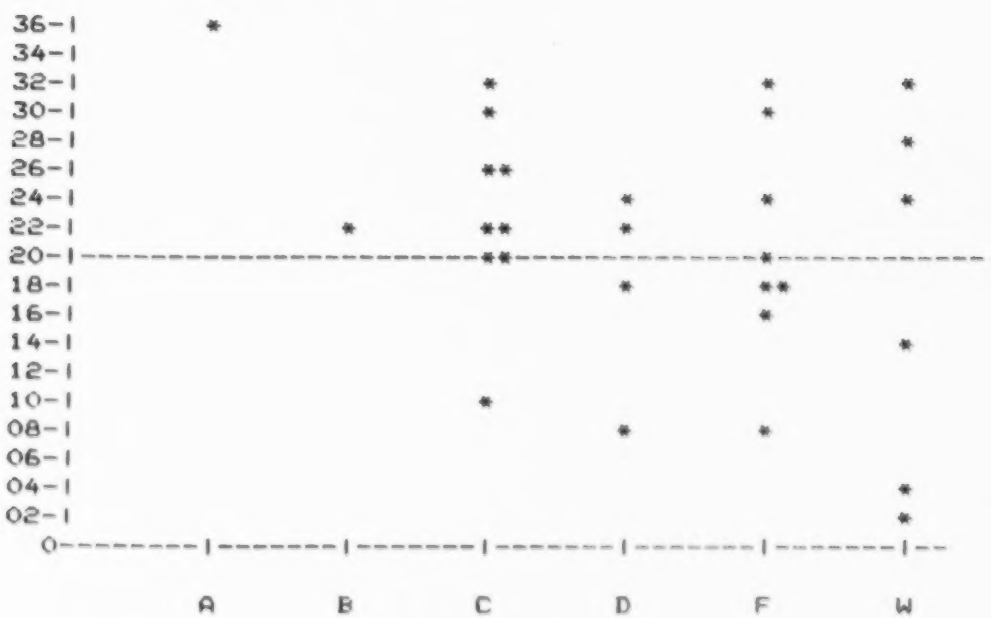
	FINAL GRADE					
TESTS	A	B	C	D	F	W
READING:						
- X correct answers on vocabulary test:	65.8	63.6	55.2	51.2	49.8	58.3
- X correct answers on Comprehension subtest:	50.2	50.0	45.0	42.3	40.4	42.4
- X correct answers on Total test:	116.1	113.6	100.2	93.6	90.3	100.7
Total number possible = 172						
COMPUTATIONAL:						
- X correct answers on Numerical subtest:	29.5	27.5	26.3	23.0	24.4	23.1
Total number possible = 40						
CRITICAL THINKING:						
- X correct answers on Critical thinking subtest:	55.4	54.3	48.1	48.2	46.3	42.3
Total number possible = 80						

TABLE III.

Relationship between reading scores, below the college level, and final grade in Fundamentals of Chemistry.

Final Grade in Fund. of Chemistry	Number of students with total reading scores at the 35th%ile or lower
A	1
B	1
C	9
D	4
F	8
W	6
	29

GRAPHIC INTERPRETATION OF TABLE III.



Looking at the graph III it is clear that reading scores lower than the 20th%ile are highly related to unsuccessful grades in Fundamentals of Chemistry. Reading at or above the the 20th %ile is apparently necessary but not sufficient for successful completion of this chemistry course. This information may prove to be useful to academic advisors working with students that have developmental reading skills and an interest in enrolling in Fundamentals of Chemistry.

CONCLUSIONS:

The relationship between critical thinking scores and final grades in fundamentals of chemistry is not as strong as the reading relationship. It is difficult to establish consistent scores on the critical thinking test that correspond to successful course outcomes. The relationship between math scores and final grades is weak. It can not be said that a high math test score relates to a successful final grade. Many students who scored well on the math test did not do well in the course. Conversely, some students who did not do well on the math test did extremely well in the course.

I think that this study has provided us with some quantitative information about the relationship between reading, math, and critical thinking skills and performance in Fundamentals of Chemistry. There appears to be some evidence that reading at or above the 20th %ile is necessary for successful completion of Fundamentals of Chemistry. It should not be said that math and critical thinking skills do not have a role in predicting success in Fundamentals of Chemistry. The relationships may be mediated by other variables not addressed in this study.

Overall, the project was successful. Follow-up studies are suggested as a method of establishing the reliability of these results. New theories could also be tested at that time.

ERIC Clearinghouse for
Junior Colleges NOV 20 1997